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THE IMPACT OF THE NORTH KOREAN SUBMARINE FORCE  
AT THE OPERATIONAL LEVEL OF WAR

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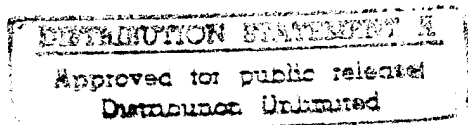
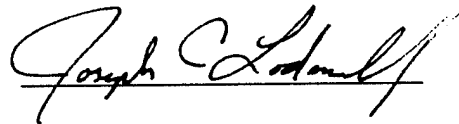
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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

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*Abstract of*

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The threat of the North Korean submarine force, with its obsolete submarines, may easily be dismissed by a capable navy. For the Joint Task Force (JTF) Commander in a major regional conflict (MRC) involving North Korea, however, this submarine force could affect many operational level decisions.

The Falkland Islands War showed that a small, tactically ineffective submarine force could impact the operational commander's decisions just by being at sea and unlocated. In a Korean MRC, the North Koreans could do the same, except its submarine force is several times larger and, from open source literature on U.S. Antisubmarine Warfare (ASW) methods and littoral ASW problems, the North Koreans can learn how to best keep the submarines unlocated.

Using these lessons, the North Koreans can develop a submarine employment plan that can impact the JTF Commander's decisions involving operational design and operational function, such as movement, maneuver, protection, and logistics. In a worst case, the North Korean submarine threat could make all maritime operations so risky as to virtually suspend use of the seas in the Korean region until the threat is eliminated.

The only effective way to counter this threat is to neutralize the submarines before they leave port. Failing in this, it becomes a time consuming and asset intensive operation to regain control of the sea or to provide protection for those ships in threatened areas.

## TABLE OF CONTENTS

ABSTRACT . . . . .	ii
Introduction . . . . .	1
The DPRK Submarine Force . . . . .	2
Lessons of the Falkland Islands War . . . . .	2
Littoral Warfare Lessons . . . . .	5
Possible DPRK Submarine Employment Plan . . . . .	6
Operational Issues of Concern . . . . .	8
Operational Movement and Maneuver . . . . .	9
Operational Protection . . . . .	11
Operational Logistics . . . . .	12
Courses of Action of the Operational Commander . . . . .	13
Recommendation . . . . .	16
NOTES . . . . .	19
BIBLIOGRAPHY . . . . .	21

## THE IMPACT OF THE NORTH KOREAN SUBMARINE FORCE AT THE OPERATIONAL LEVEL OF WAR

### **Introduction.**

If the United States were to become involved in a major regional conflict (MRC) against North Korea, the Democratic Republic of Korea (DPRK) submarine force could pose a significant threat at the operational level of war for the United States. This statement may be disputed by many who assume that the DPRK's unsophisticated submarines, with crews that are only moderately proficient in basic submarine operations,<sup>1</sup> offer only a minimal threat at worst.

Using lessons from the Falklands War and studies of anti-submarine warfare (ASW) in littoral regions, an employment plan for the DPRK submarine force could be developed that impacts the operational level decisions of the Joint Task Force (JTF) Commander. Decisions involving operational design and operational function such as movement, maneuver, logistics and protection of maritime forces could be affected even if only a single DPRK submarine cannot be located.

The best means of countering the DPRK submarines would be to neutralize them while they are in port. If this is not accomplished the problem becomes asset intensive and time consuming. The JTF Commander could lessen the impact of these submarines on his operational decisions by attacking the submarine command and control structure or the logistics and maintenance infrastructure. Logistics shipments can be provided protection by use of convoys or providing transit lanes that are swept clear of submarines.

### **The DPRK Submarine Force.**

Most of the submarines employed by the DPRK are of a 1940s or 1950s Soviet Union design. They include 21 or 22 ships of the Chinese version of the Soviet Romeo class and four Soviet Whiskey class diesel attack submarines.<sup>2,3</sup> In addition to these submarines, the DPRK reportedly has nine new SANG-O class coastal submarines<sup>4</sup> and between 48 and 67 midget submarines.<sup>5,6</sup> This paper will consider only the Romeo class submarines in its arguments, but the others have capabilities that could further complicate the JTF Commander's problems.

After transfer of four Romeo class submarines from China in 1973 and 1974, North Korea began to produce its own Romeos. As of 1994, it was still producing these submarines at a rate of one every two years.<sup>7</sup> Although these are generally similar to the late 1950s Soviet version, those more recently produced are likely to have numerous changes in equipment,<sup>8</sup> possibly with a significant performance improvement over earlier versions.<sup>9</sup> It is also significant to note that almost all of these submarines are less than 20 years old, which means most should be in a condition to at least get underway and conduct basic submerged operations.

### **Lessons of the Falkland Islands War.**

The impact of the Argentinean submarines on Admiral Woodward, the British Battle Group Commander in the 1982

Falklands War, can provide lessons of how the North Koreans could best employ their submarines in a regional conflict.

At the beginning of the Falklands War, Argentina had four submarines. Although only two were operational, all (or at least three) affected Admiral Woodward's operational decisions. These submarines included a World War II vintage Guppy class, the A.R.A. *Santa Fe* and an eight year old German Type 209 class, the A.R.A. *San Luis*. A second Type 209 was not employed because of a noise problem.<sup>10</sup> The other Guppy class submarine, though inoperable, was towed from port to port to give the illusion that it was still seaworthy.<sup>11</sup>

The *Santa Fe*, ". . . a more likely candidate for a place in a naval museum than in combat . . .,"<sup>12</sup> made an 800 nautical mile round trip to Port Stanley,<sup>13</sup> then a trip in excess of 1000 nautical miles to South Georgia Island, successfully avoiding the British blockade enroute.<sup>14</sup> At South Georgia, it was attacked by a British helicopter and forced to ground itself.<sup>15</sup>

The *San Luis*, manned by an inexperienced, newly assembled crew, operated for six to seven weeks in excess of 800 nautical miles from its home base.<sup>16</sup> *San Luis* claims it conducted three torpedo attacks against British surface ships, but did no damage because of a combination of fire control equipment problems and human error.<sup>17</sup>

Though these submarine operations were tactically ineffective, a significant portion of the operating time of

two ASW Carriers, more than a dozen frigates and destroyers, four nuclear submarines, and one diesel submarine was diverted from other ~~missions~~ missions to provide protection from the submarine threat.<sup>18</sup> In addition, the anti-submarine Sea King squadrons maintained the equivalent of four aircraft continuously airborne for a month on anti-submarine and surface search sorties.<sup>19</sup> British forces also expended over 200 rounds of ASW ordinance<sup>20</sup> in their effort to counter a threat that consisted of only one or two submarines.

Why were a few poorly operated diesel submarines able to have such an impact on the British forces? The answer lies in one of the submarines greatest assets, its stealth. The British did not really know how many Argentinean submarines were at sea. Throughout much of the war, Woodward thought the Argentines had both Type 209 submarines at sea and the mere possibility that one or more submarines might be at sea caused the British grave concern:

When the British established that the Argentine conventional subs were out of port, the ubiquitous nature of a submarine went into effect. British ASW forces assumed they might be anywhere or everywhere in the theater of naval operations . . . .<sup>21</sup>

The threat of a submarine affected such operations as the South Georgia assault, the Falklands landing, and aircraft carrier employment. During the South Georgia operation, Woodward noted in his diary ". . . South Georgia op seems bogged down for fear of ARG submarine (conventional, Santa Fe)."<sup>22</sup> In choosing a landing site for the Falkland Island



invasion, the landing plans minimized ". . . the danger of submarine attack by steering well clear of the Port Stanley area."<sup>23</sup> Likewise, Woodward's decision to keep the carriers away from the Falkland Islands during the invasion was in part because ". . . the (Args' likely) submarine area is exactly where we would need to be to do the job."<sup>24</sup>

In summary, the mere possibility that a submarine might be in the area (even an ancient, decrepit, World War II diesel submarine) was sufficient to affect operational decisions by Admiral Woodward.

#### **Littoral Warfare Lessons.**

As seen in the Falklands example, the stealth of a submarine creates a problem for the opposing forces. As long as it can remain unlocated, it remains a threat. Intelligent use of the littoral environment and its enemies weaknesses can aid a submarine crew in remaining an unlocated threat.

In the shallow littoral water, a submarine crew will be able to take advantage of the geography, topography, oceanography, environmental factors and heavy shipping volume that combine to pose a significant technical and tactical ASW problem. In a Korean MRC, the DPRK submarine force will have an advantage because of its familiarity with the regional environment.<sup>25</sup> In addition, even a Romeo class diesel is quiet and provides little Doppler effect when operating slowly on the battery.<sup>26</sup> Active sonar is also limited by the shallow

environment as well as by the low target strength of a small, diesel submarine.

Recent emphasis on littoral warfare and concern about the proliferation of diesel submarines has provided an abundance of open source literature on U.S. ASW methods and those littoral characteristics that make ASW most difficult. Such sources claim that U.S. ASW philosophy assumes that third world diesel submarines will frequently snorkel and expose their masts. Additionally, surface ships with towed sonar arrays are counted on to control basin areas, such as the Sea of Japan, while aircraft radar searches are used in areas surrounding basins.<sup>27</sup> Combining this type of information with the lessons from the Falklands, the North Koreans could develop a submarine employment plan that maximizes the potential threat to the opposing coalition and minimizes the risk of detection and destruction of the DPRK submarines.

#### **Possible DPRK Submarine Employment Plan.**

From the Falklands example, it can be seen that the DPRK submarines could create a threat that the JTF Commander cannot ignore just by getting underway and submerging. Even a non-operational submarine can become a threat if it can be made to disappear, such as by scuttling, thus becoming another 'unaccounted for' DPRK submarine.

Once at sea, the DPRK submarines can improve the likelihood of remaining undetected by avoiding operations, such as snorkeling, that have a higher risk of detection. Of

course a submarine must snorkel to recharge its batteries, but by staying submerged or bottomed during the day and snorkeling at night, the chance of detection is greatly reduced. Risk is also reduced by deploying to areas least likely to be covered by ASW units, such as the North Korea coast, where the submarine would be under the protection of anti-air and anti-ship defensive systems. The submarines could even be moved into Chinese territorial water, where they would be virtually immune to prosecution, knowing that the United States is not likely to do anything that might draw China into the conflict.

The DPRK submarine force may not be operationally proficient, but after 30 years of operating submarines, a few of their commanders and crews should possess some degree of basic skill. If a few can venture into coalition shipping lanes or operating areas, the perceived threat would appear even greater. If any of the DPRK submarines could match the *Santa Fe's* transit of over a thousand nautical miles, then it could operate anywhere in the waters surrounding Korea or Japan (see figure 1). As shown, this area includes many of the key maritime routes and vital chokepoints that would be used by naval forces, logistics shipping, and merchant shipping going to and from Japan and South Korea.<sup>28</sup>

A perceived threat is one thing, but actually hitting a merchant or warship with a torpedo would, of course, confirm that the threat is real. In looking at the Falkland's War lessons, one might conclude that the diesel submarines posed

little threat because they were unable to effectively employ their torpedoes. This lesson may not be applicable to the North Koreans. The inexperienced Argentinean crew tried to use a complex anti-ship torpedo which requires a large number of settings and a complex fire control system.<sup>29</sup> Would the results have been the same if they were operating an older, simple system with which they were familiar? The North Koreans would be using the same relatively simple weapon system that they have trained with for 30 years or more. Even if the North Koreans were unable to successfully launch a torpedo, covertly laying mines in chokepoints (an easier task that is likely to be within their capability) could threaten shipping through the vital maritime routes of that region.

Another consideration when discussing capability is the possibility that the crew is not entirely North Korean. Just as the Iranian Kilo submarines appear to be supported and partially manned by Russian personnel, as were the Libyan Foxtrots,<sup>30</sup> a few Chinese advisors with a DPRK submarine crew might be just enough to enable a non-proficient DPRK crew to achieve a little success.

#### **Operational Issues of Concern.**

In a conflict that has a significant maritime aspect and is confined to relatively small area, any opposing submarines at sea will affect the JTF Commander's operational decisions. The JTF Commander will be concerned with the ability to conduct movement and maneuver of maritime forces and how this

will impact such aspects of his planning as operational reach and tempo. The use of maritime forces for operational protection against a submarine threat might conflict with other uses of these same assets and necessitate a different operational sequence than might otherwise be preferred. In any protracted conflict, logistics or sustainment will have a significant impact on the ability to continue the fight. The use of South Korean ports as bases of operation, with associated lines of operation and communication, must also be considered in light of the submarine threat. It quickly becomes evident that there are many operational aspects that can be affected by a submarine threat though this paper will only consider a few that are most affected.

**Operational Movement and Maneuver.** In a Korean MRC, the JTF Commander will have numerous maritime forces at his disposal. These are likely to include carrier battlegroups, submarines, and amphibious forces. But the JTF Commander's ability to fully use these powerful assets may be seriously impacted by the fear of losing a ship to a submarine. If a single DPRK submarine is at sea, the JTF Commander may not be willing to risk a high value unit (e.g., an aircraft carrier, an amphibious ship loaded with Marines or a Marine Prepositioning Ship) on the chance that the submarine crew will not be good enough (or lucky enough) to successfully launch a torpedo at the ship. If he is willing to take that

risk with one submarine, will the answer be the same if the North Koreans manage to get ten or fifteen submarines to sea?

Just as Admiral Woodward had to consider the submarine threat when making the decision on which of the Falkland's beaches to land or how far from the Falklands to keep the carriers during the invasion, the JTF Commander will have to decide if the risk is too great to operate carriers in the seas around Korea and Japan. In the worst case, if the perception of the submarine threat is severe enough, the carriers may be restricted to areas so distant that the usefulness of their aircraft is seriously limited. Likewise the JTF Commander must weigh the benefit of an amphibious operation against the risk that a DPRK submarine may successfully attack one or more of the amphibious ships. In the extreme case, this might mean that amphibious landings are considered too risky, eliminating or delaying the employment of operational maneuver from the sea.

Besides the threat of sinking a ship, the DPRK submarines ability to covertly conduct reconnaissance gives the North Koreans the capability to monitor the movement and employment of maritime forces, as well as South Korean or Japanese coastal activity. Even if limited in this capability, as long as there are DPRK submarines at sea, the JTF Commander will have to assume that at least some basic capability exists and is being used. This is especially important when planning

operations that depend on the element of surprise or are to be used for operational deception.

Any impact on the operational maneuver of the carrier or amphibious forces also directly affects the operational reach that can be attained with maritime forces. This may not be significant if land forces in Korea and land based air forces are capable of handling the conflict with little maritime support, but it could be crucial if the JTF Commander must rely heavily on the maritime forces. If Marines cannot be landed or if carrier operations must be held up waiting on the completion of ASW operations, then the operational tempo, the operational momentum and the operational sequencing may all be driven by the submarine threat.

**Operational Protection.** If the JTF Commander decides to risk the use of carrier battlegroups or amphibious forces in the waters around Korea then a major concern will be the operational protection of these forces. ASW has historically required a very high ratio of ASW assets per submarine and there is little reason to believe that it is much better today. An idea of how asset dependent ASW can be is illustrated in the following:

In his articles entitled "Navies in War and Peace," Admiral Gorshkov observed that in World War II there were twenty-five Allied ships and 100 aircraft involved in ASW operations for each German submarine at sea. The same disparate use of ASW forces to handle the threat of only two small conventional enemy submarines seems to have taken place off the Falklands Islands.<sup>31</sup>

A large number of ASW assets will be required to protect maritime forces from the DPRK submarines that might possibly get to sea. The JTF Commander may not have the dedicated assets to conduct this kind of ASW effort and may have to divert assets from other operations. This diversion of assets could significantly impact other operations and extend the time before local sea control is regained.

Even if significantly fewer ASW forces per submarine are required, the magnitude of the problem is large. While Admiral Woodward's decisions were affected by one or two submarines that might have been at sea, the JTF Commander in Korea would face a problem of a different magnitude. If the North Koreans deployed only half of their Romeo class, they would have five times as many submarines at sea as the Argentines ever had (and then there is still the Whiskey, Sang-O, and midget submarines) and would seriously compound the operational protection problem.

**Operational Logistics.** The submarine threat may not only impact decisions on maritime operations, but could prevent or severely limit access to South Korean ports. If these ports are unavailable then coalition forces would have to operate from more distant bases of operation, which would extend the lines of operation and greatly complicate the magnitude of this MRC.

While it may be unlikely that the North Koreans could succeed in closing the South Korean ports as bases of



operations, the DPRK submarine's greatest actual threat is probably to logistics shipping going into and out of these ports. For a submarine force with minimal capabilities, merchant shipping would be the easiest target that could be attacked. The JTF Commander will be risking the loss of vital ships and supplies by requiring them to transit through possible DPRK submarine operating areas. Though the *Atlantic Conveyor* was sunk in the Falklands War by an air launched missile, not a torpedo, its loss, with all of the British heavy lift helicopters on board, still illustrates the great impact the loss of one key merchant ship can have. The loss of a Marine Prepositioning Ship would not be of any less consequence in Korea than the loss of *Atlantic Conveyor* was in the Falklands. This may necessitate taking other options, such as reloading cargo so as to have vital equipment and supplies split between ships and could have a major impact on the number and types of ships required for transport.

#### **Courses of Action for the Operational Commander.**

What courses of action does the operational commander have to minimize the impact of the DPRK submarine force? As discussed, if the submarines are at sea, then an operational problem already exists. One view of how to handle the submarine problem in littoral warfare as expressed by VADM William Owens is:

. . . it may be enough to know where the other submarines are. As long as they are not interfering

with our primary mission, all we need to know is where they are and how to avoid them. Then they pose no threat to us and we can get on to more important things.<sup>32</sup>

While this may be true, the problem is knowing where the opposing submarines are at all times. This may not be too difficult when dealing with one or two, but it is a very different problem when opposing 10 or 20 submarines. If even one submarine is unaccounted for, then the JTF Commander will have to consider that threat in every operational decision that he makes that involves maritime forces.

The obvious conclusion then is to neutralize the submarines before they get to sea. Unfortunately, the North Koreans are likely to attack with little warning and will probably have their operational submarines at sea before offensive action could be taken against them. If they do make the mistake of not getting all of the submarines out of port before hostilities erupt, then the JTF Commander must be ready to immediately attack those remaining or at least mine the exit routes from the submarine ports so as to prevent them from deploying.

The effectiveness of the DPRK submarines that are at sea can be reduced by attacking the command and control structure. Trying to operate several submarines in a relatively confined area would imply that the North Koreans probably have to keep fairly rigid control over the submarines. Destruction of the command and control structure should reduce the submarine's effectiveness by denying North Korea the ability to change

operating areas or tasking of its submarines. Though this may be effective in the long term, it will do little to solve the immediate problem of countering 'unaccounted for' submarines.

A second long term solution is to destroy the logistics and repair infrastructure that the submarine is dependent upon for long term operations. If a submarine cannot obtain repairs or get parts and supplies, it will only be a matter of time before it reaches the point of being inoperable. Again this takes time and it will be difficult for the JTF Commander to know when a submarine is incapable of being a threat. This returns again to the basic problem that an unlocated submarine is a threat because it cannot be proven otherwise.

Just as the DPRK submarines can take advantage of the littoral environment, so can the JTF Commander when determining where to employ his assets. Because a diesel submarine is more vulnerable to attack in deep water,<sup>33</sup> the JTF Commander can reduce, but not eliminate, the risk by operating in the deep water basins when feasible and avoiding the shallow areas that favor the diesel submarine. A study of the oceanographic features of the area would determine those regions that most favor ASW efforts and are least favorable for a submarine to remain undetected. These areas can be used for operations, such as carrier operations, that do not require a ship to move from one point to another.

For logistics movements, ASW efforts would be necessary to provide protection for convoys between Japan and Korea.

Fortunately, these relatively short routes make it a problem of reasonable magnitude. Depending on the available assets, it may even be feasible to use ASW assets to keep maritime transit lanes swept clear of submarines rather than escort convoys. Since the effective range of a torpedo is relatively short, these safe transit lanes would not have to be very wide. Use of smaller vessels between Japan and Korea might also be beneficial, if the volume of cargo can still be carried. Smaller merchants provide a smaller target with a shallower draft and are thus somewhat more difficult targets for the submarine. Splitting vital cargo between these smaller vessels will also limit the impact if one is sunk. However, this obviously takes more time and requires more merchant vessels.

#### **Recommendation.**

Though the DPRK submarine force may be one of the least capable, operating some of the most obsolete submarines in the world, the sheer number of submarines it has means it cannot be entirely ignored. If only half of the DPRK Romeos get underway, then ten submarines would be operating in the confined area where the JTF Commander's maritime forces must operate. After studying the Argentinean submarine operations in the Falklands War and littoral warfare lessons, it is clear that these submarines could be employed in such a manner as to affect the JTF Commander's operational decisions. Once the submarines get to sea, a threat exists that cannot be ignored

and can only be countered through lengthy, asset intensive ASW operations.

From the Falklands experience, it is obvious that the JTF Commander would need many ASW assets. If not already enroute, ASW ships and aircraft must be obtained as quickly as possible. Use of friendly submarines adds an additional ASW search platform, but also complicates the identification problem for the other platforms.<sup>34</sup> A coordination plan must be developed to eliminate the chance of air or surface assets attacking a coalition submarine, while at the same time minimizing the chance that a DPRK submarine will get away while waiting to determine if it is friend or foe.

The only good solution that remains for the JTF Commander, however, is to neutralize the DPRK submarine force before it ever leaves port.

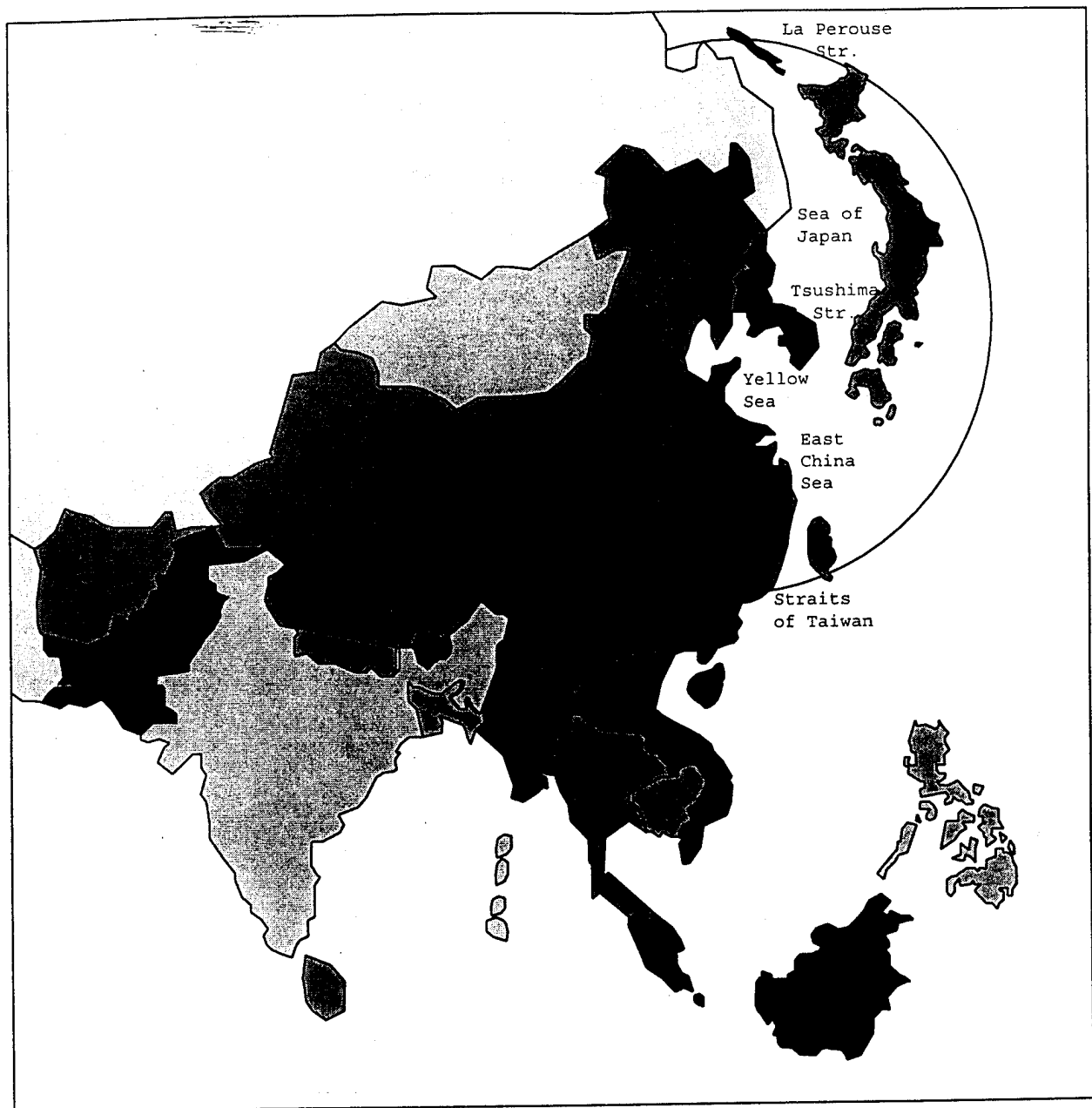


Figure 1. Possible Operating Radius of the North Korean Submarine Force.

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